Ideas for Final Projects

In no particular order, and some more challenging than others :-)

1. A more massive planetary simulation (i.e. the solar system or some larger than two system)
2. A simulation of charges accumulating on a needle one charge at a time...how do they distribute themselves? See article by Griffiths
3. Grow a DLA and explore how it's fractal dimension depends on the nature of the growth parameters in the model.
4. The "famous" one-dimensional gas problem.
5. Percolation theory: propagation of forest fires or spread of disease
6. Create a simulation to compute the precession of mercury's orbit around the sun with a General Relativistic corection to Newtonian gravity.
7. Simulation of several (as many as possible; but start with two) H_2O molecules interacting in 2D or 3D. Part of the work would be animating the molecules in motion.
8. Solving Laplace's equation in electrostatics---create images of the electric potential and field around the plates of a capacitor, for instance. See this image on our home page created by Derek Arel, a past graduate who took computational physics and made the image linked.
9. Create a simulation to explore planetary ring formation.
10. Chaos in a driven non-linear oscillator.
11. Induced current in a solenoid as a magnetic falls through the solenoid.
12. Study the Ising model in 1 or 2D.
13. Study the approach to equilibrium in a bimodal mass 1D gas in a tube.
14. Study a Van Der Waals gas and how it turns to a liquid from a gas as it cools.